

REMARKS

Claims 1-6, and 9-22 are all the claims presently being examined in this application. Claims 1 and 2 have been amended to more particularly define the claimed invention. Claims 7 and 8 have been canceled. Claims 12-22 have been added to claim additional features of the claimed invention. No new matter has been added.

It is noted that the amendments are made only to more particularly define the invention and not for distinguishing the invention over the prior art, for narrowing the scope of the claims, or for any reason related to a statutory requirement for patentability. It is further noted that, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

Applicant has amended the Abstract and the Specification to change every occurrence of "vertical" and "vertically" with the term "perpendicular" and "perpendicularly," respectively. Applicant has made these amendments to more clearly and accurately disclose the present invention, and in accordance with commonly used terminology for specifying directional orientation.

Claim 2 is objected to for lack of antecedent basis. The language of claim 1 has been amended to now recite "a part of light," giving proper antecedent basis for the language in claim 2, of "the part of light."

Claims 1-5 and 9 are rejected under 35 U.S.C. § 102(e) as being anticipated by Benitez et al., U.S. Pat. No. 6,896,381.

Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Benitez et al. in view of Koike et al., U.S. Pat. No. 6,345,903.

Claims 7 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Benitez et al. in view of Priesemeth, U.S. Pat. No. 5,452,190.

Claims 10 and 11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Benitez et al. in view of Gasquet et al., U.S. Pat. No. 6,755,556.

These rejections are respectfully traversed in view of the following discussion.

I. APPLICANT'S CLAIMED INVENTION

The claimed invention (as defined, for example, by independent claim 1) is directed to a an LED package comprising light emitting element, a first optical section that is disposed around the light emitting element, and a second optical section that is disposed around the first optical section while being separated from the first optical section. A gap is formed between the first and second optical sections, the gap allowing a part of light emitted from the light emitting element to be radiated from the first optical section as nearly parallel light converged in the direction perpendicular to the center axis of the light emitting element, and the second optical section includes a reflection surface to reflect the nearly parallel light in the direction parallel to the center axis of the light emitting element.

Conventionally, a lens-type LED package is well known that uses a light emitting element as light source and is designed to radiate light emitted from the light emitting element in a predetermined direction while controlling its lighting distribution by using an optical system. However, the conventional LED package needs to use a large reflection mirror so as to efficiently control light not to be entered to the lens. Therefore, the amount of light to be controlled by the extension becomes considerable. On the other hand, when using such a large reflection mirror, the diameter of lens to the outer diameter becomes relatively small, a problem is generated that, due to the lowering of convergence performance, it becomes impossible to radiate light with sufficient brightness in a desired direction and range.

(Application at page 2, line 23 to page 3, line 15).

The claimed invention (e.g., as recited in claim 1), on the other hand, includes a first optical element that allows a part of light emitted from the light emitting element to be radiated from the first optical section as nearly parallel light converged in a direction perpendicular to a center axis of the light emitting element, and a gap between the a second optical element to allow the nearly parallel light radiated from the first optical section to be reflected in the direction parallel to the center axis of the light emitting element by a reflection surface on the second optical section. Therefore, Applicant's invention can better control the light emitted from the light emitting element and, thus, offers a high efficiency of external radiation.

II. THE ALLEGED PRIOR ART REJECTIONS

A. Benitez et al., U.S. Pat. No. 6,896,381

The Examiner alleges that Benitez et al. (Benitez) teaches the invention of claims 1-5 and 9. Applicant submits, however, that Benitez fails to teach or suggest each and every element of the claimed invention.

Benitez teaches, generally, a method for manufacturing an apparatus and the apparatus being configured to convert a first distribution of an input radiation to a second distribution of output radiation. The method consists of the steps of generating a two-dimensional representation of at least three active optical surfaces of an optical device including calculating a segment of a first surface based on edge ray sets as a first generalized Cartesian oval, calculating a segment of an entry surface based on the edge ray set as a second generalized Cartesian oval, calculating a segment of a second surface based on the edge ray set as a third generalized Cartesian oval, and successively repeating the steps of calculating the segment of the first surface and calculating the segment of the second surface in a direction towards a source, and rotationally sweeping the two-dimensional representation about a central axis providing a three-dimensional representation of the optical device. (Abstract.)

Specifically, Benitez fails to teach or suggest a first optical section that is disposed around the light emitting element, *wherein the first optical element allowing a part of light emitted from the light emitting element to be radiated from the first optical section as nearly parallel light converged in a direction perpendicular to a center axis of the light emitting element*, as recited in claim 1. Additionally, Benitez fails to teach or suggest a gap formed between the first and second optical sections, wherein the gap allows the part of light emitted from the light emitting element to be radiated from the first optical section as nearly parallel light converged in the direction perpendicular to the center axis of the light emitting element, and the second optical section includes a reflection surface *to reflect the nearly parallel light in the direction parallel to the center axis of the light emitting element*, as recited in claim 1.

Benitez teaches “a transparent dome of the optical source 30 is comprised of a hemisphere region 31 extending to a short cylindrical section 32 below the hemisphere region. An emitting chip 33 is immersed within the dome medium, having for example a refractive index of 1.54, and mounted on a substrate 34,” (column 8, lines 41-46, and Figs. 3

and 4). Benitez then clearly states, in relationship to Figs. 5 and 5a, that the geometric propagation of light emanating from the light source 33, *i.e.*, ray fan 50, is in a spherical wavefront:

“Accordingly, FIGS. 5 and 5a depict a simplified cross-section view block-diagrams of a dome-packaged LED 30 and light-emitting chip 33 mounted on a silicon base 34 which in turn is mounted on a planar reflective surface or mirror 35. Referring to FIG. 5 depicting an enlarged cross-sectional view of a source, where a ray fan 50 radiates from a first corner or edge, for example the rightmost corner 36 of the chip 33. The ray fan 50 represents a generally spheric wavefront propagating outward therefrom.” (Column 9, lines 33-41).

Additionally, Benitez’s continues to teach a “spheric wavefront propagating outward” from a light source in the description with respect to Figs. 5B, 6-11, and 15-17.

Therefore, not only are Applicant’s claimed features not taught or suggested by Benitez, but Benitez clearly teaches away from Applicant’s claimed recitations of a first optical element allowing a part of light emitted from the light emitting element to be radiated from the first optical section as nearly parallel light converged in a direction perpendicular to a center axis of the light emitting element, a gap allowing the part of light emitted from the light emitting element to be radiated from the first optical section as nearly parallel light converged in the direction perpendicular to the center axis of the light emitting element, and finally, the second optical section includes a reflection surface to reflect the nearly parallel light in the direction parallel to the center axis of the light emitting element, as recited in claim 1. Clearly, the main focus of the Benitez reference is how to create a secondary lens that outputs a collimated light by manipulating the spherically radiated light transmitted from a dome-packaged LED.

Therefore, Applicant respectfully submits that the Benitez reference and the additional references used in combination with Benitez to reject claims 6-11, would not have been combined and even if combined, the combination would not teach or suggest each and every element of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

B. Koike et al., U.S. Pat. No. 6,345,903

With respect to the rejection of Applicant’s claim 6, Applicant respectfully submits

that Koike et al. would not have been combined with Benitez and even if combined, the combination would not teach or suggest each and every element of the claimed invention, since Benitez, as pointed out above, fails to teach or suggest each and every element of the claimed invention, and Koike et al. fails to overcome the deficiencies of Benitez

Specifically, Koike et al. fails to teach or suggest “*a...gap allowing a part of light emitted from the light emitting element to be radiated from the first optical section as nearly parallel light converged in the direction perpendicular to the center axis of the light emitting element, and the second optical section includes a reflection surface to reflect the nearly parallel light in the direction parallel to the center axis of the light emitting element.*”

Therefore, the Examiner is respectfully requested reconsider and withdraw this rejection.

C. Gasquet et al., U.S. Pat. No. 6,755,556

With respect to the rejection of Applicant's claims 10 and 11, Applicant respectfully submits that Gasquet et al. would not have been combined with Benitez and even if combined, the combination would not teach or suggest each and every element of the claimed invention, since Benitez, as pointed out above, fails to teach or suggest each and every element of the claimed invention, and Gasquet et al. fails to overcome the deficiencies of Benitez

Specifically, Gasquet et al. fails to teach or suggest “*a...gap allowing a part of light emitted from the light emitting element to be radiated from the first optical section as nearly parallel light converged in the direction perpendicular to the center axis of the light emitting element, and the second optical section includes a reflection surface to reflect the nearly parallel light in the direction parallel to the center axis of the light emitting element.*”

Therefore, the Examiner is respectfully requested reconsider and withdraw this rejection.

D. Newly Added Independent Claims 12 and 20 with Respect to the Applied Prior Art References

With respect to Applicant's newly added independent claim 12, the applied prior art references or any combination thereof fail to teach or suggest that first and second optical sections *are in contact with each other in a region of a range of about 45 degrees or less to the center axis of the light emitting element*, a gap allows part of light emitted from the light

emitting element to *be radiated from the first optical section as nearly parallel light converged in the direction perpendicular to the center axis of the light emitting element*, and the second optical section includes a reflection surface to *reflect the nearly parallel light* in the direction parallel to the center axis of the light emitting element.

In addition to the lack teaching or suggestion by the applied prior art references with respect to *the part of light radiated from the first optical section as nearly parallel light*, as discussed above, the applied prior art references or any combination thereof fail to teach or suggest *the first and second optical sections being in contact with each other*, much less, in a region of *about 45 degrees or less to the center axis of the light emitting element*. In fact, Benitez clearly teaches the presence of a gap between the optical source 30 and the lens 20:

“The optical source 30 is positioned at least partially within the cavity 19. The lens 20 is positioned about the source 30 such that the entry surface 25 of the cavity 19 is positioned and maintained in close proximity to the LED source. In some embodiments, the entry surface of the cavity is maintained within at least ± 1.0 mm, preferably within at least ± 0.1 mm, and more preferably within at least ± 0.05 mm of an intended position relative to the LED.” (Column 8, lines 54-61.)

With respect to Applicant’s newly added independent claim 20, the applied prior art references or any combination thereof fail to teach or suggest wherein the first and second optical sections *are in contact with each other in a region between, about 45 degrees or less to the center axis of the light emitting element, and the center axis of the lighting element*, and wherein a gap is formed between the first and second optical sections in a region *between, about 45 degrees or less to the center axis of the light emitting element, and 90 degrees to the center axis of the lighting element*, the gap allows part of light emitted from the light emitting element to *be radiated from the first optical section as nearly parallel light converged in the direction perpendicular to the center axis of the light emitting element*, and the second optical section includes a reflection surface to *reflect the nearly parallel light* in the direction parallel to the center axis of the light emitting element.

Benitez fails to teach or suggest a first and second optical sections *in contact with each other*, much less, *in a region between, about 45 degrees or less to the center axis of the light emitting element, and the center axis of the lighting element*. (See argument above.) Additionally, Benitez fails to teach or suggest a gap formed between the first and second optical sections in a region *between, about 45 degrees or less to the center axis of the light*

emitting element, and 90 degrees to the center axis of the lighting element.

Therefore, none of the cited prior art references nor any alleged combination thereof teach or suggest each and every element of Applicant's claimed invention with respect to newly added claims 12-22.

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-6, and 9-22, the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

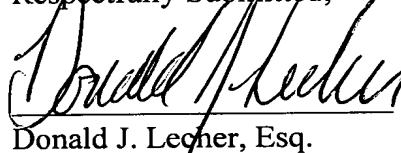
Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Date: _____

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Respectfully Submitted,



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